What is claimed is:

1. An interpolation method of defining a function F on a one-dimensional structured grid formed on a one-dimensional real region, the function being defined through definition of a value thereof at a center of each cell within the one-dimensional structured grid, as an interpolation function H, the method comprising the steps of:

setting, with respect to a cell of interest on the one-dimensional structured grid, a slope to zero if a forward difference and a backward difference of the function f have different signs, and to a value twice as large as a smaller one of absolute values of the forward difference and the backward difference if the forward difference and the backward difference have the same sign; and

defining the function F on a partial region of the one-dimensional real region determined by the cell of interest, by a linear function having a value of F0 at a center of the cell of interest and the slope.

2. An interpolation method as claimed in claim 1, wherein the interpolation method is applied to a numerical solution of an advection-type differential equation.

3. An interpolation method of defining a function F on a two-dimensional structured grid formed

on a two-dimensional real region, the function being defined through definition of a value thereof at a center of each cell within the two-dimensional structured grid, as an interpolation function H, the method comprising the steps of:

setting a cell of interest to a cell A, the cell A having a first side extending in an x direction, a second side extending in the x direction and being opposite to the first side, a third side extending in a y direction, and a fourth side extending in the y direction and being opposite to the third side;

defining values twice as large as values of one-sided differences of the function F between a center of the cell A and respective centers of four cells adjacent to the cell A on the first side, the second side, the third side, and the fourth side, as a first-sided difference (DFxmin), a second-sided difference (DFxmax), a third-sided difference (DFymin), and a fourth-sided difference (DFymax), respectively, and setting an x-direction difference to zero if the first-sided difference and the second-sided difference have different signs, and to a smaller one of absolute values of the first-sided difference and the second-sided difference if the first-sided difference and the second-sided difference have the same sign, and a y-direction difference to zero if the third-sided difference and the fourth-sided difference have

different signs, and to a smaller one of absolute values of the third-sided difference and the fourth-sided difference if the third-sided differences and the fourth-sided difference have the same sign;

forming an interpolation function candidate which has slopes defined by the x-direction difference and the y-direction difference, respectively, and has a value F0 of the function F at the center of the cell A and setting this candidate to a plane B;

modifying, if a value of the plane B at a first grid point at a location of intersection of the first side and the third side of the cell A is larger than a value of the center of the cell A, the plane B by multiplying the x-direction difference and the y-direction difference by a largest constant not more than 1 such that the value of the plane B at the first grid point does not exceed any of values of the function F at respective centers of three cells having the first grid point in common except for the cell A;

modifying, if the value of the plane B at the first grid point is smaller than the value of the center of the cell A, the plane B by multiplying the x-direction difference and the y-direction difference by a largest constant not more than 1 such that the value of the plane B at the first grid point does not fall below any of the values of the function F at the respective centers of the three cells having the grid

point in common except for the cell A; and

carrying out, on the plane B thus obtained, the same operation as carried out as to the first grid point, as to a second grid point at a location of intersection of the first side and the fourth side of the cell A, a third grid point at a location of intersection of the second side and the third side, and a fourth grid point at a location of intersection of the second side and the fourth side, to thereby change the slope of the plane B, and define the resulting plane as the interpolation function within the cell A.

4. An interpolation method of defining a function F on a three-dimensional structured grid formed on a three-dimensional real region, the function being defined through definition of a value thereof at a center of each cell within the three-dimensional structured grid, as an interpolation function H, the method comprising the steps of:

setting a cell of interest to a cell A, the cell A having a first side extending in an x direction, a second side extending in the x direction and being opposite to the first side, a third side extending in a y direction, a fourth side extending in the y direction and being opposite to the third side, a fifth side in a z direction, and a sixth side extending in the z direction and being opposite to the fifth side;

defining values twice as large as values of one-

sided differences of the function F between a center of the cell A and respective centers of six cells adjacent to the cell A on the first side, the second side, the third side, the fourth side, the fifth side, and the sixth side, as a first-sided difference (DFxmin), a second-sided difference (DFxmax), a third-sided difference (DFymin), a fourth-sided difference (DFymax), a fifth-sided difference (DFzmax), and a sixth-sided difference (DFzmin), respectively, and setting an x-direction difference to zero if the first-sided difference and the second-sided difference have different signs, and to a smaller one of absolute values of the first-sided difference and the second-sided difference if the first-sided difference and the second-sided difference have the same sign, a y-direction difference to zero if the third-sided difference and the fourth-sided difference have different signs, and to a smaller one of absolute values of the third-sided difference and the fourth-sided difference if the third-sided differences and the fourth-sided difference have the same sign, and a z-direction difference to zero if the fifth-sided difference and the sixth-sided difference have different signs, and to a smaller one of absolute values of the fifth-sided difference and the sixth-sided difference if the fifth-sided difference and the sixth-sided difference have the same sign;

forming an interpolation function candidate which has slopes defined by the x-direction difference, the y-direction difference, and the z-direction difference, respectively, and has a value F0 of the function F at the center of the cell A and setting this candidate to a plane B;

modifying, if a value of the plane B at a first grid point at a location of intersection of the first side, the third side, and the fifth side of the cell A is larger than the value of the center of the cell A, the plane B by multiplying the x-direction difference, the y-direction difference, and the z-direction difference, by a largest constant not more than 1 such that the value of the plane B at the first grid point does not exceed any of the values of the function F at respective centers of seven cells having the first grid point in common except for the cell A;

modifying, if the value of the plane B at the first grid point is smaller than the value of the center of the cell A, the plane B by multiplying the x-direction difference, the y-direction difference, and the z-direction difference, by a largest constant not more than 1 such that the value of the plane B at the first grid point does not fall below any of the values of the function F at the respective centers of the seven cells having the grid point in common except for the cell A; and

carrying out, on the plane B thus obtained, the same operation as carried out as to the first grid point, on a second grid point at a location of intersection of the first side, the third side, and the sixth side, a third grid point at a location of intersection of the first side, the fourth side, and the fifth side, a fourth grid point at a location of intersection of the first side, the fourth side, and the sixth side, a fifth grid point at a location of intersection of the second side, the third side, and the fifth side, and a sixth grid point at a location of intersection of the second side, the third side, and the sixth side, a seventh grid point at a location of intersection of the second side, the fourth side, and the fifth side, and an eighth grid point at a location of intersection of the second side, the fourth side, and the sixth side, to thereby change the slope of the plane, and define the resulting plane as the interpolation function within the cell A.

5. An interpolation method as claimed in claim 4, wherein the interpolation method is applied to a numerical solution of an advection-type differential equatio.

6. An apparatus for carrying out an interpolation method of defining a function F on a one-dimensional structured grid formed on a one-dimensional real region, the function being defined through

definition of a value thereof at a center of each cell within the one-dimensional structured grid, as an interpolation function H, the apparatus comprising:

a setting device that sets, with respect to a cell of interest on the one-dimensional structured grid, a slope to zero if a forward difference and a backward difference of the function F have different signs, and to a value twice as large as a smaller one of absolute values of the forward difference and the backward difference if the forward difference and the backward difference have the same sign; and

a definition device that defines the function F on a partial region of the one-dimensional real region determined by the cell of interest, by a linear function having a value of F0 at a center of the cell of interest and the slope.

7. An apparatus for carrying out an interpolation method of defining a function F on a two-dimensional structured grid formed on a two-dimensional real region, the function being defined through definition of a value thereof at a center of each cell within the two-dimensional structured grid, as an interpolation function H, the apparatus comprising:

a cell-setting device that sets a cell of interest to a cell A, the cell A having a first side extending in an x direction, a second side extending in the x direction and being opposite to the first side, a third

side extending in a y direction, and a fourth side extending in the y direction and being opposite to the third side;

a difference-setting device that defines values twice as large as values of one-sided differences of the function F between a center of the cell A and respective centers of four cells adjacent to the cell A on the first side, the second side, the third side, and the fourth side, as a first-sided difference (DFxmin), a second-sided difference (DFxmax), a third-sided difference (DFymin), and a fourth-sided difference (DFymax), respectively, and sets an x-direction difference to zero if the first-sided difference and the second-sided difference have different signs, and to a smaller one of absolute values of the first-sided difference and the second-sided difference if the first-sided difference and the second-sided difference have the same sign, and a y-direction difference to zero if the third-sided difference and the fourth-sided difference have different signs, and to a smaller one of absolute values of the third-sided difference and the fourth-sided difference if the third-sided differences and the fourth-sided difference have the same sign;

an interpolation function candidate-forming device that forms an interpolation function candidate which has slopes defined by the x-direction difference and

the y-direction difference, respectively, and has a value F0 of the function F at the center of the cell A and setting this candidate to a plane B;

a first modification device that modifies, if a value of the plane B at a first grid point at a location of intersection of the first side and the third side of the cell A is larger than a value of the center of the cell A, the plane B by multiplying the x-direction difference and the y-direction difference by a largest constant not more than 1 such that the value of the plane B at the first grid point does not exceed any of values of the function F at respective centers of three cells having the first grid point in common except for the cell A;

a second modification device that modifies, if the value of the plane B at the first grid point is smaller than the value of the center of the cell A, the plane B by multiplying the x-direction difference and the y-direction difference by a largest constant not more than 1 such that the value of the plane B at the first grid point does not fall below any of the values of the function F at the respective centers of the three cells having the grid point in common except for the cell A; and

a definition device that carries out, on the plane B thus obtained, the same operation as carried out as to the first grid point, as to a second grid point at a

location of intersection of the first side and the fourth side of the cell A, a third grid point at a location of intersection of the second side and the third side, and a fourth grid point at a location of intersection of the second side and the fourth side, to thereby change the slope of the plane B, and define the resulting plane as the interpolation function within the cell A.

8. An apparatus for carrying out an interpolation method of defining a function F on a three-dimensional structured grid formed on a three-dimensional real region, the function being defined through definition of a value thereof at a center of each cell within the three-dimensional structured grid, as an interpolation function H, the apparatus comprising:

a cell-setting device that sets a cell of interest to a cell A, the cell A having a first side extending in an x direction, a second side extending in the x direction and being opposite to the first side, a third side extending in a y direction, a fourth side extending in the y direction and being opposite to the third side, a fifth side in a z direction, and a sixth side extending in the z direction and being opposite to the fifth side;

a difference-setting device that defines values twice as large as values of one-sided differences of

the function F between a center of the cell A and respective centers of six cells adjacent to the cell A on the first side, the second side, the third side, the fourth side, the fifth side, and the sixth side, as a first-sided difference (DFxmin), a second-sided difference (DFxmax), a third-sided difference (DFymin), a fourth-sided difference (DFymax), a fifth-sided difference (DFzmax), and a sixth-sided difference (DFzmin), respectively, and sets an x-direction difference to zero if the first-sided difference and the second-sided difference have different signs, and to a smaller one of absolute values of the first-sided difference and the second-sided difference if the first-sided difference and the second-sided difference have the same sign, a y-direction difference to zero if the third-sided difference and the fourth-sided difference have different signs, and to a smaller one of absolute values of the third-sided difference and the fourth-sided difference if the third-sided differences and the fourth-sided difference have the same sign, and a z-direction difference to zero if the fifth-sided difference and the sixth-sided difference have different signs, and to a smaller one of absolute values of the fifth-sided difference and the sixth-sided difference if the fifth-sided difference and the sixth-sided difference have the same sign;

an interpolation function candidate-forming device

that forms an interpolation function candidate which has slopes defined by the x-direction difference, the y-direction difference, and the z-direction difference, respectively, and has a value F0 of the function F at the center of the cell A, and setting this candidate to a plane B;

a first modification device that modifies, if a value of the plane B at a first grid point at a location of intersection of the first side, the third side, and the fifth side of the cell A is larger than the value of the center of the cell A, the plane B by multiplying the x-direction difference, the y-direction difference, and the z-direction difference, by a largest constant not more than 1 such that the value of the plane B at the first grid point does not exceed any of the values of the function F at respective centers of seven cells having the first grid point in common except for the cell A;

a second modification device that modifies, if the value of the plane B at the first grid point is smaller than the value of the center of the cell A, the plane B by multiplying the x-direction difference, the y-direction difference, and the z-direction difference, by a largest constant not more than 1 such that the value of the plane B at the first grid point does not fall below any of the values of the function F at the respective centers of the seven cells having the grid

point in common except for the cell A; and

a definition device that carries out, on the plane B thus obtained, the same operation as carried out as to the first grid point, on a second grid point at a location of intersection of the first side, the third side, and the sixth side, a third grid point at a location of intersection of the first side, the fourth side, and the fifth side, a fourth grid point at a location of intersection of the first side, the fourth side, and the sixth side, a fifth grid point at a location of intersection of the second side, the third side, and the fifth side, and a sixth grid point at a location of intersection of the second side, the third side, and the sixth side, a seventh grid point at a location of intersection of the second side, the fourth side, and the fifth side, and an eighth grid point at a location of intersection of the second side, the fourth side, and the sixth side, to thereby change the slope of the plane, and define the resulting plane as the interpolation function within the cell A.

9. A control program for causing a computer to execute an interpolation method of defining a function F on a one-dimensional structured grid formed on a one-dimensional real region, the function being defined through definition of a value thereof at a center of each cell within the one-dimensional structured grid, as an interpolation function H, the method comprising

the steps of:

setting, with respect to a cell of interest on the one-dimensional structured grid, a slope to zero if a forward difference and a backward difference of the function f have different signs, and to a value twice as large as a smaller one of absolute values of the forward difference and the backward difference if the forward difference and the backward difference have the same sign; and

defining the function F on a partial region of the one-dimensional real region determined by the cell of interest, by a linear function having a value of F0 at a center of the cell of interest and the slope.

10. A control program for causing a computer to execute an interpolation method of defining a function F on a two-dimensional structured grid formed on a two-dimensional real region, the function being defined through definition of a value thereof at a center of each cell within the one-dimensional structured grid, as an interpolation function H, the method comprising the steps of:

setting a cell of interest to a cell A, the cell A having a first side extending in an x direction, a second side extending in the x direction and being opposite to the first side, a third side extending in a y direction, and a fourth side extending in the y direction and being opposite to the third side;

defining values twice as large as values of one-sided differences of the function F between a center of the cell A and respective centers of four cells adjacent to the cell A on the first side, the second side, the third side, and the fourth side, as a first-sided difference (DFxmin), a second-sided difference (DFxmax), a third-sided difference (DFymin), and a fourth-sided difference (DFymax), respectively, and setting an x-direction difference to zero if the first-sided difference and the second-sided difference have different signs, and to a smaller one of absolute values of the first-sided difference and the second-sided difference if the first-sided difference and the second-sided difference have the same sign, and a y-direction difference to zero if the third-sided difference and the fourth-sided difference have different signs, and to a smaller one of absolute values of the third-sided difference and the fourth-sided difference if the third-sided differences and the fourth-sided difference have the same sign;

forming an interpolation function candidate which has slopes defined by the x-direction difference and the y-direction difference, respectively, and has a value F0 of the function F at the center of the cell A and setting this candidate to a plane B;

modifying, if a value of the plane B at a first grid point at a location of intersection of the first

side and the third side of the cell A is larger than a value of the center of the cell A, the plane B by multiplying the x-direction difference and the y-direction difference by a largest constant not more than 1 such that the value of the plane B at the first grid point does not exceed any of values of the function F at respective centers of three cells having the first grid point in common except for the cell A;

modifying, if the value of the plane B at the first grid point is smaller than the value of the center of the cell A, the plane B by multiplying the x-direction difference and the y-direction difference by a largest constant not more than 1 such that the value of the plane B at the first grid point does not fall below any of the values of the function F at the respective centers of the three cells having the grid point in common except for the cell A; and

carrying out, on the plane B thus obtained, the same operation as carried out as to the first grid point, as to a second grid point at a location of intersection of the first side and the fourth side of the cell A, a third grid point at a location of intersection of the second side and the third side, and a fourth grid point at a location of intersection of the second side and the fourth side, to thereby change the slope of the plane B, and define the resulting plane as the interpolation function within the cell A.

11. A control program for causing a computer to execute an interpolation method of defining a function F on a three-dimensional structured grid formed on a three-dimensional real region according to a shape of the fluid, the function being defined through definition of a value thereof at a center of each cell within the three-dimensional structured grid, as an interpolation function H, the method comprising the steps of:

setting a cell of interest to a cell A, the cell A having a first side extending in an x direction, a second side extending in the x direction and being opposite to the first side, a third side extending in a y direction, a fourth side extending in the y direction and being opposite to the third side, a fifth side in a z direction, and a sixth side extending in the z direction and being opposite to the fifth side;

defining values twice as large as values of one-sided differences of the function F between a center of the cell A and respective centers of six cells adjacent to the cell A on the first side, the second side, the third side, the fourth side, the fifth side, and the sixth side, as a first-sided difference (DFxmin), a second-sided difference (DFxmax), a third-sided difference (DFymin), a fourth-sided difference (DFymax), a fifth-sided difference (DFzmax), and a sixth-sided difference (DFzmin), respectively, and setting an x-

direction difference to zero if the first-sided difference and the second-sided difference have different signs, and to a smaller one of absolute values of the first-sided difference and the second-sided difference if the first-sided difference and the second-sided difference have the same sign, a y-direction difference to zero if the third-sided difference and the fourth-sided difference have different signs, and to a smaller one of absolute values of the third-sided difference and the fourth-sided difference if the third-sided differences and the fourth-sided difference have the same sign, and a z-direction difference to zero if the fifth-sided difference and the sixth-sided difference have different signs, and to a smaller one of absolute values of the fifth-sided difference and the sixth-sided difference if the fifth-sided difference and the sixth-sided difference have the same sign;

forming an interpolation function candidate which has slopes defined by the x-direction difference, the y-direction difference, and the z-direction difference, respectively, and has a value F0 of the function F at the center of the cell A and setting this candidate to a plane B;

modifying, if a value of the plane B at a first grid point at a location of intersection of the first side, the third side, and the fifth side of the cell A

is larger than the value of the center of the cell A, the plane B by multiplying the x-direction difference, the y-direction difference, and the z-direction difference, by a largest constant not more than 1 such that the value of the plane B at the first grid point does not exceed any of the values of the function F at respective centers of seven cells having the first grid point in common except for the cell A;

modifying, if the value of the plane B at the first grid point is smaller than the value of the center of the cell A, the plane B by multiplying the x-direction difference, the y-direction difference, and the z-direction difference, by a largest constant not more than 1 such that the value of the plane B at the first grid point does not fall below any of the values of the function F at the respective centers of the seven cells having the grid point in common except for the cell A; and

carrying out, on the plane B thus obtained, the same operation as carried out as to the first grid point, on a second grid point at a location of intersection of the first side, the third side, and the sixth side, a third grid point at a location of intersection of the first side, the fourth side, and the fifth side, a fourth grid point at a location of intersection of the first side, the fourth side, and the sixth side, a fifth grid point at a location of

intersection of the second side, the third side, and the fifth side, and a sixth grid point at a location of intersection of the second side, the third side, and the sixth side, a seventh grid point at a location of intersection of the second side, the fourth side, and the fifth side, and an eighth grid point at a location of intersection of the second side, the fourth side, and the sixth side, to thereby change the slope of the plane, and define the resulting plane as the interpolation function within the cell A.